CLAIMS

WHAT IS CLAIMED IS:

1. A selected-wavelength tuning apparatus, comprising:

an acoustic optical tunable filter for rotating polarization in accordance with a radio-frequency signal and for branching light into selected-wavelength light and light with other wavelengths in accordance with the radio-frequency signal;

a radio-frequency signal generating means for generating said radio-frequency signal;

a light intensity detecting means for detecting light from said acoustic optical tunable filter; and

a radio-frequency signal controlling means for controlling said radio-frequency signal generating means so as to select light of a predetermined wavelength in accordance with an output of said light detecting means.

2. The selected-wavelength tuning apparatus according to claim 1, wherein

said radio-frequency signal controlling means comprises

a maximum value discriminating means for discriminating the maximum value of said light intensity with respect to an optical signal of a predetermined wavelength by receiving said light intensity from said light intensity detecting means while changing the frequency of said radio-frequency signal generated by said radio-frequency signal generating means; and

a frequency controlling means for controlling said radio-frequency signal generating means so as to generate the radio-frequency with the frequency which makes the maximum light intensity discriminated by said maximum value discriminating means.

3. The selected-wavelength tuning apparatus according to claim 2, wherein

said frequency controlling means generates a frequency which is smaller than the frequency of said radio-frequency signal supplied from said radio-frequency signal generating means and

said radio-frequency signal generating means

superimposes said frequency of said frequency controlling means with said radio-frequency signal.

4. The selected-wavelength tuning apparatus according to claim 2, wherein said frequency controlling means controls the frequency of said radio-frequency signal so that the light intensity of said optical signal of specific wavelength is maximized every time said optical signal of specific wavelength is changed.

5. The selected-wavelength tuning apparatus according to claim 1, wherein

said radio-frequency signal controlling means, further comprises

a reference signal adding means for adding a reference signal whose wavelength is known to the optical input side of said AOTF and

said radio-frequency signal controlling means for detecting said reference signal from the output of said light intensity detecting means and computing the relationship between the selected-wavelength of said AOTF and the radio-frequency based on the detecting result.

6. The selected-wavelength tuning apparatus according to claim 5, wherein the wavelength of said reference signal is the wavelength at the edge of the wavelength band for transmitting said optical signal.

7. The selected-wavelength tuning apparatus according to claim 1, wherein

said light intensity detecting means is an optical spectrum analyzer for further detecting said light wavelength and

said radio-frequency signal controlling means generates the radio-frequency signal with a known frequency and computes the relationship between the selected-wavelength of said AOTF and the radio-frequency based on the output of said optical spectrum analyzer.

8. The selected-wavelength tuning apparatus according to claim 7, further comprising an optical amplifier connected to the optical input side of said AOTF.

9. The selected-wavelength tuning apparatus according to claim 1, comprising

a plurality of said acoustic optical tunable filters are formed on the same single substrate and

temperature controlling means for controlling temperature of the plurality of said acoustic optical tunable filters to be the same.

10. The selected-wavelength tuning apparatus according to claim 1, wherein

said radio-frequency signal controlling means comprises

intensity maximum value discriminating means for discriminating the maximum value of said light intensity with respect to an optical signal of predetermined wavelength by receiving said light intensity from said light intensity detecting means while changing the intensity of said radio-frequency signal generated by said radio-frequency signal generating means and

intensity controlling means for controlling said radio-frequency signal generating means so that it generates the radio-frequency signal having the intensity which sets the light intensity discriminated by said intensity maximum value discriminating means at the maximum.

11. The selected-wavelength tuning apparatus according to claim 1, comprising

superimposing means for superimposing a low-frequency signal to said radio-frequency signal and

tracking means for controlling said radio-frequency signal generating means so as to maintain the light intensity of the optical signal of said predetermined wavelength at the maximum by detecting said low-frequency signal from the optical signal exited from said AOTF.

12. The selected-wavelength tuning apparatus according to claim 11, a selected-wavelength tuning filter wherein

a light entered to said AOTF is a wavelength-division multiplexed optical signal and

said tracking means controls said radio-frequency signal generating means within a range of radio-frequency

corresponding to the distance of said wavelength-division multiplexed optical signal.

13. AOTF which outputs an optical signal of specific wavelength in accordance with the frequency of said first radio-frequency signal and the frequency of said second radio-frequency signal as a first output, and outputs light with other wavelengths as a second output, comprising:

first polarizing means for branching an optical input into TM and TE mode lights;

first radio-frequency signal applying means for applying first radio-frequency signal to a first optical waveguide for propagating the TM mode light branched by said first polarizing means;

second radio-frequency signal applying means for applying second radio-frequency signal to a second optical waveguide for propagating the TE mode light branched by said first polarizing means; and

second polarizing means for multiplexing optical signals from said first optical waveguides to which said first radio-frequency signal has been applied and said second optical waveguides to which said second radio-frequency signal has been applied, and branching them as first and second outputs corresponding to the state of polarization of the light.

14. The selected-wavelength tuning apparatus, comprising:

AOTF which comprises first polarizing means for branching an optical input into TM and TE mode lights,

first radio-frequency signal applying means for applying first radio-frequency signal to a first optical waveguide which is for propagating the TM mode light branched by said first polarizing means,

second radio-frequency signal applying means for applying second radio-frequency signal to a second optical waveguide for propagating the TE mode light branched by said first polarizing means, and

second polarizing means for multiplexing optical signals from said first optical waveguides to which said first

radio-frequency signal has been applied and said second optical waveguides to which said second radio-frequency signal has been applied, and branching them as first and second outputs corresponding to the state of polarization of the light;

radio-frequency signal generating means for generating said radio-frequency signal;

light intensity detecting means for detecting the intensity of light from said AOTF; and

radio-frequency signal control means for controlling said radio-frequency generating means so as to select light of a predetermined wavelength in accordance with the output of said light intensity detecting means.

15. The selected-wavelength tuning apparatus according to claim 14, wherein

said radio-frequency signal applying means are two radio-frequency signal applying means, of which the first radio-frequency signal applying means applies the radio-frequency signal to the TM mode light branched by said first polarizing means and the second radio-frequency signal applying means applies the radio-frequency signal to the TE mode light branched by said first polarizing means and

said radio-frequency signal generating means supplies the radio-frequency signals of different frequencies to said first and second radio-frequency signal applying means.

16. The selected-wavelength tuning apparatus according to claim 14, further comprising third polarizing means for branching the lights exited from said first output into TM mode and TE mode lights, and wherein

said light intensity detecting means comprises a first light intensity detecting means for detecting the light intensity of TM mode light exited from said third polarizing means and a second light intensity detecting means for detecting the light intensity of TE mode light exited from said third polarizing means.

17. The selected-wavelength tuning apparatus, comprising

AOTF for rotating polarization in accordance with a

radio-frequency signal and for branching light into selected-wavelength light and light with other wavelengths in accordance with the radio-frequency signal and

a plurality of radio-frequency signal generating means for generating said radio-frequency signals.

18. An optical add/drop multiplexer for adding and dropping optical signals from wavelength-division multiplexed optical signals, comprising a selected-wavelength tuning apparatus which comprises:

an AOTF for rotating polarization in accordance with a radio-frequency signal and for branching light into selected-wavelength light and light with other wavelengths in accordance with the radio-frequency signal;

radio-frequency signal generating means for generating said radio-frequency signal;

light intensity detecting means for detecting the intensity of light from said AOTF; and

radio-frequency signal controlling means for controlling said radio-frequency signal generating means so as to select light of a predetermined wavelength in accordance with the output of said light intensity detecting means.

19. The optical add/drop multiplexer according to claim 18, in which a plurality of acoustic optical tunable filters are connected in tandem.

20. An optical spectrum analyzer, comprising:

AOTF for rotating polarization in accordance with a radio-frequency signal and for branching light into selected-wavelength light and light with other wavelengths in accordance with the radio-frequency signal;

light intensity detecting means for detecting the intensity of the light from said AOTF;

radio-frequency signal controlling means for controlling said radio-frequency signal generating means so as to select light of a predetermined wavelength in accordance with the output of said light intensity detecting means; and

storage means for storing the frequencies of said radio-frequency signal that changes and light intensity

detected by said light intensity detecting means with respect to the frequency.

21. The optical spectrum analyzer according to claim 20, further comprising rejecting means for rejecting the light exited from said AOTF.

22. An optical add/drop multiplexer for adding and dropping optical signals from wavelength-division multiplexed optical signals, comprising a spectrum analyzer which comprises:

AOTF for rotating polarization in accordance with a radio-frequency signal and for branching light into selected-wavelength light and light with other wavelengths in accordance with the radio-frequency signal;

radio-frequency signal generating means for generating said radio-frequency signal;

light intensity detecting means for detecting the intensity of light from said AOTF;

radio-frequency signal controlling means for controlling said radio-frequency signal generating means so as to select light of a predetermined wavelength in accordance with the output of said light intensity detecting means; and

storage means for storing the frequencies of said radio-frequency signal that changes and light intensity detected by said light intensity detecting means with respect to the frequency.

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